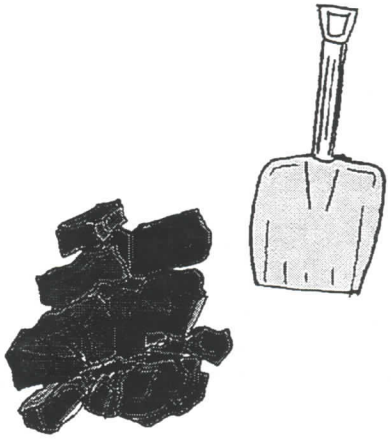
COAL MINING

Pre-Visit Activity



Activity	**Black Gold**
Setting	Classroom
Duration	Approximately one hour
Subject Areas	Language Arts, Science, Reading
Skills	Geology
Grade Level	4-5

Objectives:

Students will be able to:
1. **describe how coal is formed and the stages of coal**
2. **name the types of coal and how to identify each type**

WV-IGOs:

Language arts - 4.9, 4.13, 4.14, 4.15, 4.36, 5.2, 5.13, 5.16, 5.20
Science - 4.13, 4.15, 4.29, 4.3, 4.31, 5.1, 5.13, 5.23, 5.59

VOCABULARY

coal
peat
lignite
bituminous coal
anthracite coal

MATERIALS

1. coal samples
2. Resource Page — How Coal is Formed

BACKGROUND

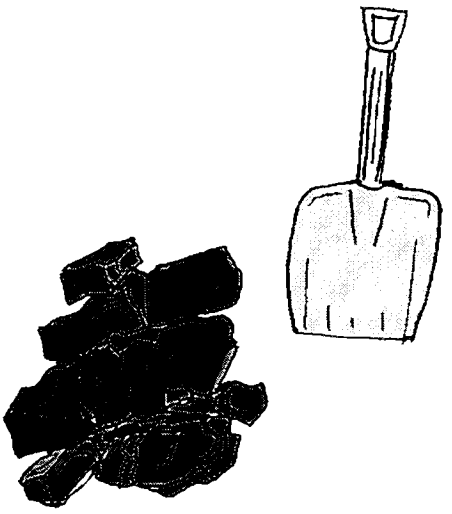
Coal was one of man's earliest sources of heat and light. The Chinese were known to have dug coal more than 3,000 years ago. The first recorded discovery of coal was by French explorers on the Illinois River in 1679. The earliest recorded commercial mining occurred near Richmond, Virginia, in 1750. Coal grew in importance rapidly during the 19th century. Mining in the New River Gorge began with the completion of the Chesapeake and Ohio Railway in 1873. With mining came a new and fascinating era that molded and shaped lives of the people in the area. Kaymoor and Nuttallburg were two major coal towns in the New River area.

Both you and the students will enjoy reading the many facts related to this topic. The amount of material available on coal is enormous. You will find many individuals, as well as companies willing to offer you assistance. See "Additional Resources for Teachers" for companies and agencies that can provide additional resources for studying about coal and coal mining.

PROCEDURES

1. Write the word "coal" on the board and develop a definition as a class.

2. Have students tell the class any knowledge they have of coal (student knowledge will vary).



PROCEDURES *Continued*

3. Using the information and materials provided, introduce coal as an abundant natural resource found in West Virginia and other parts of the world.

4. Using the Resource Page — How Coal is Formed, discuss the process of coal formation and the different stages of its development. List the stages of development on the board and help the students understand the definition of each.

5. Divide the class into groups of four or five students. Hand out samples of peat, lignite, and coal to each group. Have students brainstorm the characteristics of each type and list these under the proper type on the board. Be sure that all the appropriate characteristics are listed for each of the samples.

EVALUATION

Include the vocabulary words as part of a vocabulary test.

EXTENSION

1. Have students research ways that coal is used.

2. Students can make a collage of items used in their daily lives that are made from coal.

COAL MINING

Resource Page — How Coal Is Formed

By The American Coal Foundation

Coal is classified by geologists as a mineral. But most minerals, like salt or stone or iron ore, were formed millions of years ago by inorganic matter, or substances that were never alive. Coal, on the other hand, came from organic matter — plants that lived about 300 million years ago.

During the Carboniferous Period, the earth was covered with huge swampy forests where plants — giant ferns, reeds, and mosses — grew taller than our tallest trees today. As these plants grew, some died and fell into the swamp waters. New plants grew and died. In time, there was a thick layer of dead plants rotting in the swamp.

The surface of the earth changed, and layers of sediments washed over the plant material and compressed the plants. Heat and pressure produced chemical and physical changes in the plant layers, which forced out oxygen and left rich carbon deposits. Over time, the plant material became coal. Geologists say that it may have taken a layer of plants 20-feet thick to form a coal seam one-foot thick. Coal seams vary in thickness from a few inches to more than 100 feet.

We know that coal was made from plants because we often find fossils, or impressions, of these early plants in coal. Fossils can be in the shape of stumps, leaves, seeds, or other plant parts, or they even may be whole plants. This is why some people call coal "buried sunlight." The plants from which coal was formed had absorbed energy from the sun. As the plants decayed, some of the energy escaped, but most of it remained. Today, when we burn coal, we use what is left of the sun's energy of 300 million years ago.

Coal is classified into three kinds: lignite, bituminous, and anthracite. These classifications are based on the amount of carbon, oxygen, and hydrogen present in the coal. These amounts can vary with the location of the coal bed, the kind of plants that formed the coal, and the degree of change brought about by heat and pressure.

Peat, while it is not coal, is the first product in the coal scale. The plants changed first into peat and then into a type of coal. Peat is brown, crumbly, lightweight and spongy in texture. You may see part of the original plants that formed it — roots, leaves, and bark. Most of the peat produced in the United States is used to improve the soil on lawns, golf courses, and gardens, in greenhouses and nurseries. It is also used as packing material for plants and shrubs, as insulating material, as an ingredient in fertilizers and litter for livestock. In many countries of Europe, peat is burned as fuel. Peat is being formed in the United States even today in the Dismal Swamp in Virginia and North Carolina, the Everglades in southern Florida, and in many other small bogs and coastal swamps.

COAL MINING

Resource Page — How Coal Is Formed (con't)

Lignite is the lowest rank of coal, which means that it has the lowest heat content of the three types of coal and was formed from peat. Perhaps you can still see some of the peaty structure in the sample. Although lignite is more solid than peat, it crumbles when shipped long distances, so it usually is used close to the mine. It has a high moisture content too, but dries out when exposed to air. Most of the lignite in the United States is in North and South Dakota, Montana, and Texas. Lignite is used principally to produce electricity at power plants.

Bituminous coal, or soft coal as it is sometimes called, was formed by added heat and pressure on lignite. Bituminous coal appears smooth when you first see it, but look closer and you may see it is in layers. You may see a shiny, glass-like layer in coal known as vitrain, or wood that was preserved in water. Another band, dull and grayish, is clarain, formed from fine plant debris. A third, charcoal-like layer is fusain, made from chemically changed wood.

Bituminous coal is by far the most abundant type of coal. It is found in many states in the United States. More than 80 percent of the bituminous coal produced in the United States is burned to generate electricity. Other major coal users are the cement, food, paper, automobile, textile, and plastic industries. Another important industrial use is to provide coke for iron and steel industries. Bituminous coal can be changed into many different chemicals from which paint, nylon, aspirin, and other items can be made.

Anthracite, the final stage of coal making, is often called hard coal. It is deep black and looks almost metallic because it is brilliantly glossy. The primary market for anthracite is for heating homes. Nearly all of the anthracite in the United States is in Pennsylvania, but there are small beds in Idaho, Nevada, Utah, Arkansas, Tennessee, Virginia, Washington, Rhode Island, and Massachusetts.

Coal is the most abundant fossil fuel available to man, and while it has been a major energy source for over two centuries, experts say there is enough coal to last many more centuries. Almost one-third of the world's coal supply is in the United States where, according to the U.S. Geological Survey, it makes up 74 percent of the total mineral fuel supply.